

What is claimed:

1. A method for digitally watermarking digital image files comprising:
embedding a digital watermark into a digital image file;
extracting said digital watermark from a digital image file;
detecting said digital watermark to authenticate said digital image file.
2. A method for digitally watermarking digital image files comprising:
embedding a digital watermark into a digital image file;
the step of embedding comprising:
extracting magnitudes of Fourier frequencies in said digital image file;
extracting phases of Fourier frequencies in said digital image file;
encrypting a signature from the phases of said digital image file;
reassembly of said signature into said digital image file;
extracting said digital watermark from a digital image file;
the step of extracting comprising:
detecting said digital watermark to authenticate said digital image file.
3. The method of claim 2 wherein the step of embedding a digital watermark further comprises:
converting said digital image file to pixel luminance values and applying a discrete Fourier transform to said luminance values to produce a digital data file in the frequency domain.

4. The method of claim 2, wherein the step of embedding a digital watermark further comprises applying a discrete Fourier transform to said digital data file to create a frequency representation of said digital image file.

5. The method of claim 2, wherein the step of embedding a digital watermark further comprises:

separating said digital file in the frequency domain into a magnitude data file and a phase data file.

6. The method of claim 2, wherein the step of embedding a digital watermark further comprises:

applying a binary phase filter to said frequency representation of said digital file.

7. The method of claim 2, wherein the step of embedding a digital watermark further comprises:

assigning a pre-signature to the frequency data file and encrypting said pre-signature into the signature.

8. The method of claim 2, wherein the step of embedding a digital watermark further comprises:

combining encrypted signature with rounded magnitudes of the discrete Fourier transform to form modified magnitudes.

9. The method of claim 2, wherein the step of embedding a digital watermark further comprises:

forming a new frequency domain file by combining the modified magnitudes of the discrete Fourier transform and the phase data file.

10. The method of claim 2, wherein the step of embedding a digital watermark further comprises:

applying an inverse discrete Fourier transform to the new frequency domain file giving new luminance values for the digital image file.

11. The method of claim 2, wherein the step of extracting said digital watermark from said digital image file further comprises:

converting said digital image file to pixel luminance values and applying a discrete Fourier transform to said luminance values to produce a digital file in the frequency domain.

12. The method of claim 2, wherein the step of extracting said digital watermark from said digital image file further comprises:

separating said digital file in the frequency domain into a magnitude data file and a phase data file.

13. The method of claim 2, wherein the step of extracting said digital watermark from said digital image file further comprises:

rounding the magnitudes from the magnitude data file and inverting the combining and encryption process of claim 8 and then applying a binary phase filter of the output to obtain a test signature:

14. The method of claim 13, wherein the step of extracting said digital watermark from said digital data file further comprises:

applying a phase filter to the frequency representation and applying a correlation test to the term by term multiplication the output of the phase filter and the test signature

from claim 13 to determine if the digital data file is watermarked.

15. The method of claim 14, wherein said correlation test is defined by the equation:

$$Corr(x, y) = IDFT(H_{POF}^T(u, v) \bullet BS'(u, v))$$

where $Corr(x, y)$ is the inverse discrete Fourier transform of the term by term multiplication of the output of said phase filter and said the test signature and a high correlation test result indicates that said digital image file is watermarked.